

MW13d (Table 2q): Analytical results reported no detectable concentrations of petroleum compounds before or after the soil excavation and operation of the groundwater extraction system.

MW14 (Table 2r): Analytical results reported no detectable concentrations of petroleum compounds before or after the soil excavation and operation of the groundwater extraction system. MW14 was not sampled during this reporting period.

MW15 (Table 2s): Analytical results reported no detectable concentrations of petroleum compounds before or after the soil excavation and operation of the groundwater extraction system. MW15 was not sampled during this reporting period.

RW1 (Table 2t): Analytical results reported significant reductions in contaminant concentrations during system operation. No significant reductions have occurred in this reporting period and the pump was turned off in August 2003. The pump in RW1 was restarted and operated for a short period of time. A groundwater sample was collected on September 9, 2004 verifying significant contaminant reduction has occurred at the site.

RW2 (Table 2u): Significant levels of contaminant reduction were achieved and the pump was turned off on December 18, 2003. RW2 was not operated during this reporting period.

RW3 (Table 2v): Significant levels of contaminant reduction were achieved and the pump was turned off on December 18, 2003. RW3 was not operated during this reporting period.

RW4 (Table 2w): Water levels in the former UST bed location were lowered during operation of the submersible pump at RW1 and as such RW4 was not operated during the operation of RW1. After the submersible pump in RW1 was turned off, the submersible pump in RW4 was started. The groundwater extraction system was turned off on December 22, 2003 due to low water levels at RW4.

RW4 was restarted on March 30, 2004 and turned off in October 2004. Petroleum related groundwater contaminant concentrations were reported at RW4 prior to 2004. Through the operation of the groundwater extraction and treatment system at RW4, significant petroleum related groundwater contamination was captured by the extraction system and treated prior to discharge. While elevated groundwater contamination exists at RW4 after the 2004 pumping events the contamination does not appear to be migrating beyond the boundaries of the former UST basin.

Potable Well Analysis (Tables 2x to 2aa). Continued sampling of the potable wells surrounding the Tower Standard investigation have not returned any detectable petroleum related contaminant concentrations in any of the samples collected.

3.0 PROGRESS OF THE REMEDIATION SYSTEM

3.1 Total Contaminants Extracted

Fifteen (15) influent water samples have been analyzed for petroleum contaminants during this reporting period. Table 3 summarizes the water treatment system samplings including contaminant concentration, total gallons pumped during each period, and the average contaminants extracted. The complete analytical reports are included in Appendix A.

The groundwater treatment system pumped a total of 692,790 gallons of water this period and has removed 45.11 pounds of petroleum contamination (Table 3). REI restarted the system in 2004 and pumped groundwater from RW4 and MW10. Water from MW10 was extracted to keep the trays of the air stripper wet. If additional water was not run through the stripper the trays would dry out and excessive iron fouling would occur necessitating stripper cleaning and maintenance every week.

A total of 18,048,527 gallons of petroleum-impacted groundwater has been extracted during the operation of the engineered system. A total of 187 pounds of contaminants have been extracted with the active remediation system. WDNR form 4400-194 is presented in Appendix B.

3.2 Remediation System Operational Problems

The water system operated more than 90% of the time during this period. Remediation system operation was hampered by naturally occurring elevated dissolved iron concentrations. As such, the air stripper needs to be cleaned every other week to maintain system efficiency.

3.3 Remediation System Effectiveness

The groundwater treatment system had been effective throughout this reporting period, with the exception of the down time in the winter and spring. The concentrations of the contaminants that were being extracted from the groundwater, revealed a steadily decreasing trend.

3.4 Recommendations to Improve System Effectiveness

REI had continued to search for and implement efficiency improvements on the remediation system. Modifications to the system were implemented based on site specific requirements and anticipated cost savings.

3.5 Estimated Time Remaining of Remediation System Operation

REI recommends that the system not be restarted and that secondary remediation by natural attenuation be utilized as the tool to achieve case closure at this site.

4.0 SAMPLING AND MAINTENANCE SCHEDULE

4.1 Monitoring Well Sampling

The frequency of all monitoring wells will either be based on the schedule documented in the Bid Specifications generated by the WDNR or site conditions as warranted. Any changes in the sampling frequency will be documented in subsequent reports.

Groundwater elevations will be collected for all wells during every sampling event. The petroleum sampling parameters for all monitoring wells will be Petroleum Volatile Organic Carbon (PVOC), naphthalene and possible natural attenuation parameters.

4.2 Remediation System Sampling

The remediation system will remain off unless REI directed by the WDNR Project Manager and authorized by the Wisconsin Department of Commerce Project Manager to restart the system.

4.3 Remediation System Maintenance

When the system is in operation air stripper cleaning and recovery pump cleaning is periodically required at this site. Additional system maintenance is not anticipated when the system is not in operation.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Contaminant concentrations at the Tower Standard site in Lac du Flambeau, Wisconsin have shown a decreasing trend when the system is in operation. Natural attenuation monitoring will commence on a quarterly basis for the impacted wells. Wells that were historically non-detect will be sampled on an annual basis. With the use of a statistical test provided by the Wisconsin DNR, the results from these groundwater sampling events will be analyzed to determine than natural attenuation is an effective secondary remedial alternative at this site. If natural attenuation of the groundwater contamination can be statistically shown to not be a threat to human health and safety and the environment, REI will petition for case closure.

TABLE 3
WATER TREATMENT SYSTEM DATA
Tower Standard Service
Lac du Flambeau, WI

Date	Benzene		Ethylbenzene		Toluene		Xylenes		Total VOC's or PVOCC's		PAH's		Gallons Pumped Since Last Sampling Event	Average Contaminants Extracted (lbs.)*
	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent		
12/04/01	3,800	0.00	600	0.00	670	0.00	2,040	0.00	8,050	0.00	116	0.10	4,280	0.292
12/05/01	3,800	0.00	580	0.00	150	0.00	2,050	0.00	8,190	0.00	171	0.00	12,249	0.857
01/23/02	3,400	0.00	410	0.00	940	0.00	1,550	0.00	6,930	0.00	124	0.00	29,401	1.735
02/12/02	3,800	16.00	490	2.20	1,700	7.90	1,710	12.00	8,254	84.10	128	37.90	77,943	5.386
03/06/02	2,300	1.80	360	0.00	1,200	1.80	1,210	0.92	5,477	37.52	NS	NS	196,127	8.925
03/13/02	1,900	2.60	270	0.00	640	0.94	830	0.89	3,927	24.43	NS	NS	181,754	5.934
03/27/02	1,500	5.20	250	1.00	690	2.60	750	4.00	3,426	34.40	NS	NS	426,950	12.114
04/09/02	1,500	0.00	250	0.00	650	0.00	730	0.00	3,378	8.70	NS	NS	444,606	12.532
04/30/02	1,500	0.00	320	0.00	910	0.00	870	0.00	3,954	6.20	NS	NS	86,040	2.842
05/16/02	1,300	0.00	260	0.00	730	0.00	720	0.00	3,223	6.20	NS	NS	352,780	9.494
05/29/02	1,200	0.00	220	0.00	470	0.00	530	0.00	2,617	0.00	NS	NS	341,290	7.472
07/16/02	930	0.00	170	0.00	480	0.00	440	0.00	2,219	24.50	NS	NS	622,945	11.437
08/05/02	750	1.90	120	0.00	280	0.00	250	0.00	1,515	27.00	NS	NS	543,970	6.772
08/28/02	540	3.40	80	0.00	240	1.80	173	0.00	1,109	31.30	NS	NS	741,896	6.688
09/04/02	490	2.70	81	0.00	260	1.80	200	0.00	1,126	30.38	NS	NS	359,701	3.297
09/19/02	510	3.50	75	0.00	240	2.10	163	0.00	1,032	24.60	NS	NS	754,540	6.359
10/09/02	430	8.70	53	3.80	9.5	9.70	112	12.10	659	43.60	NS	NS	740,118	3.808
10/23/02	290	0.91	55	0.00	170	0.78	129	0.00	713	16.39	NS	NS	738,772	4.302
10/28/02	170	0	25	0	22	0	42.4	0	292.2	8.1	NS	NS	168,938	0.402
11/14/02	150	0.00	18	0.00	19	0.00	22.2	0.00	223	10.30	NS	NS	390,581	0.696
11/26/02	180	1.40	26	0.00	66	0.75	55	0.00	355	9.10	NS	NS	595,185	1.724
12/03/02	160	0.00	21	0.00	38	0.00	33.7	0.00	272.2	4.50	NS	NS	332,124	0.744
12/11/02	230	2.10	39	0.00	120	1.20	81	0.00	510	15.40	NS	NS	380,583	1.573
12/18/02	300	0.00	49	0.00	150	0.00	130	0.00	697	0.00	NS	NS	350,291	2.042
01/02/03	280	0.00	36	0.00	110	0.00	59	0.00	520	0.00	NS	NS	717,723	3.120
01/27/03	280	0.00	33	0.00	100	0.00	53	0.00	498	2.60	NS	NS	974,722	4.036
02/07/03	110	0.00	9.7	0.00	2	0.00	13	0.00	148	3.50	NS	NS	136,623	0.166
02/18/03	170	0.00	15	0.00	14	0.00	20	0.00	235	4.30	NS	NS	171,409	0.331
02/26/03	240	0.00	29	0.00	89	0.00	60	0.00	453	8.70	NS	NS	358,141	1.331
03/06/03	250	0.00	30	0.00	92	0.00	59	0.00	465	8.60	NS	NS	341,370	1.303
03/18/03	200	0.00	27	0.00	78	0.00	64	0.00	409	7.70	NS	NS	563,190	1.891
04/23/03	180	0.00	25	0.00	81	0.00	55	0.00	374	8.40	NS	NS	514,130	1.572
05/05/03	150	0.00	14	0.00	19	0.00	25	0.00	219	5.30	NS	NS	358,870	0.641
05/28/03	150	0.00	23	0.00	51	0.00	50	0.00	289	2.60	NS	NS	238,520	0.571
06/09/03	220	0.00	40	0.00	120	0.00	104	0.00	504	8.80	NS	NS	27,030	0.112
07/01/03	170	0.00	23	0.00	96	0.00	51	0.00	353	6.80	NS	NS	656,108	1.901
07/15/03	210	0.00	31	0.00	130	0.00	78	0.00	453	6.10	NS	NS	613,472	2.295
08/01/03	100	0.00	12	0.00	20	0.00	21	0.00	156	3.40	NS	NS	635,900	0.813
08/12/03	190	1.60	28	0.00	110	0.00	76	0.00	417	10.20	NS	NS	505,725	1.719
09/03/03											NS	NS	932,932	
09/16/03											NS	NS	88,431	
10/08/03											NS	NS	1,762	
10/13/03											NS	NS	3,464	
10/14/03											NS	NS	9,890	
10/20/03											NS	NS	33,624	
10/22/03	200	2.70	27	0.00	30	0.00	50	0.00	321	9.60	NS	NS	27,442	0.072
11/05/03											NS	NS	4,120	
11/13/03	330	6.00	85	1.70	280	6.00	219	6.80	996	35.00	NS	NS	104,271	0.839
11/19/03											NS	NS	77,390	
11/24/03	360	9.80	96	2.50	370	15.00	256	12.20	1,113	65.90	NS	NS	62,462	0.547
12/10/03	460	5.70	83	0.00	410	3.90	234	0.00	1,218	23.00	NS	NS	124,425	1.243
12/22/03													154,210	
04/19/04	4,700	0.00	2200	0.00	13,000	0.00	10,200	0.00	33,433	0.00	NS	NS	25,020	6.998
05/05/04	8,000	0.00	2200	0.00	18,000	0.00	10,500	0.00	41,890	0.00	NS	NS	19,570	6.858
05/17/04	6,000	14.00	1600	3.60	13,000	32.00	8,300	31.00	31,587	171.90	NS	NS	8,833	2.321
06/02/04	6,700	0.00	2100	0.00	16,000	0.00	10,200	0.00	38,170	0.00	NS	NS	11,327	3.617
06/16/04	8,200	0.00	2600	0.00	21,000	0.00	13,200	0.00	45,750	0.00	NS	NS	15,762	6.033
06/16/04													7,830	0.000
07/08/04	8,000	0.00	2100	0.00	19,000	0.00	11,100	0.00	40,640	0.00	NS	NS		
07/21/04	6,700	0.00	1400	0.00	14,000	0.00	7,400	0.00	31,588	0.00	NS	NS	25,678	6.786
09/09/04	5,500	0.00	1900	0.00	14,000	0.00	9,700	0.00	34,101	0.00	NS	NS	27,737	7.913
09/16/04	5,100	0.00	1700	0.00	13,000	0.00	9,200	0.00	31,920	0.00	NS	NS	12,830	3.426
10/05/04	4,400	0.00	960	0.00	11,000	0.00	7,300	0.00	26,070	0.00	NS	NS	5,330	1.162
													18,048,527	187.041

Notes:

NS = Not Sampled

*Formula Used: CE = (C x 8.34 e-9 x G)

Where: CE = Contaminant Extracted

C = Contaminant Concentration

G = Gallons of Contaminated Water Pumped

x:\rnp\0900-0000-0003\reports\update 43\0903\313\13\system data